



Washington
Department of
**FISH and
WILDLIFE**

Spokane River Fish and Flows – Recommendations and Rationale September 2012

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Spokane River hydrology and channel: Background

- Modified hydrology, but generally follows natural timing – high flows in spring, low flows in late summer, transition in early summer
- Spokane Falls limits upstream movement, separates river (also hydro projects)
- Gravel deposits important for spawning trout, as identified by Dr. Scholz (EWU)

Spokane River fish and flows

- **Native fishes adapted to natural timing, magnitude, duration, frequency of flows in natural channel features**
- **Not always ideal conditions, but favorable conditions needed for recovery from unfavorable conditions**
 - **Instream flows can protect against loss of favorable conditions**
- **Importance of natural processes that are driven by natural hydrology in natural channel**

Spokane River fishes

- 39 species – 15 H, 8 M, 16 L
- 18 native species – 11 H, 4 M, 3 L
 - Where H = strong current and flow is important in life history
 - M = strong current and flow moderately important to life history
 - L = strong current and flow are not clearly important to life history
 - Source: Wydoski & Whitney's Inland Fishes of Washington

Spokane River fishes

- Rainbow trout (including redband) & mountain whitefish –
- Recreational importance, habitat suitability (depth, velocity, substrate) known
- Whitefish make up a major portion of biomass in river, therefore ecologically very important; associated with suckers that also make up significant part of biomass of river

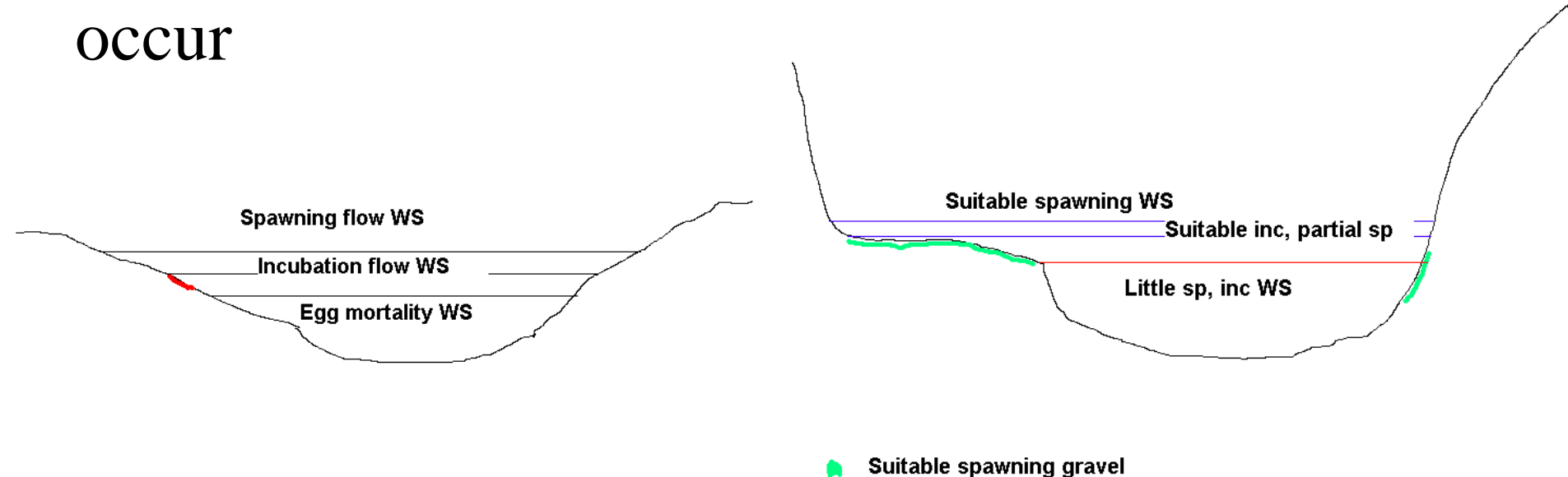
Rainbow trout

- Spawning – early April in gravel with moderate depth (usually >1 ft) and moderately fast current (1-2.5 ft/sec)
- Incubation – same place spawning happened, need to stay wet through mid-June
- Juvenile and adult rearing – generally prefer current (1-3 ft/sec) and deeper (2+ feet) for feeding and growing
- Winter – low activity – refuge in cover



Rainbow trout spawning and incubation

- Not every year is good for reproduction
- Trout can spawn several years in a row (ages 3-6)
- Can't afford to eliminate good years when they occur



Rainbow trout spawning and incubation: April 1-June 15

- Highly variable, largely unregulated flow
 - usually the **highest flows** of the year
 - generally **receding through incubation**
- We can estimate what flows would be best for spawning and for incubation
- What flow is good for incubation depends on what flow occurred when trout spawn in April

Rainbow trout spawning and incubation

- Addley and Peterson 2011 study provided new and more extensive data on trout spawning and incubation:
 - Peak spawning mid-April
 - Peak emergence early June
 - Table 5 provides specific information on inundation frequency of different spawning areas

Rainbow trout spawning and incubation

- Addley & Peterson (2011: Table 5):
 - incubation success averaged 88% (median of 95%) during 1891-2011
 - more recently averaged 80.5% with a median of 85% during 1986-2011

Rainbow trout spawning and incubation

Comparison of historical and potential incubation flows and success rates

<u>Historical period</u>	<u>Flow</u>	<u>% Incubation</u>
• Potential	9,000 cfs	95%
• Potential	8,000 cfs	91.3%
• 1891-2011	varied	88% (95)
• Potential	7,000 cfs	87.1%
• Potential	6,000 cfs	82.1%
• 1986-2011	varied	80.5% (85)
• Potential	5,000 cfs	76.2%
• Potential	4,000 cfs	70%

Rainbow trout spawning and incubation

- Standard for April-June instream flow:
 - **No reduction in incubation success** relative to the 1986-2011 period
- Incubation success should average 80-81% with a median of 85%- 90%.
- An incubation flow of **6,500 cfs** would equate to 85% incubation success on average with a median of 90%.

Rainbow trout rearing and **mountain whitefish**

- Trade-offs in upper river between flow (habitat) and temperature during summer
- High summer temperature can be stressful
- Growth in spring and fall when temperature and food production most favorable
- Winter – low activity for cold-blooded fish

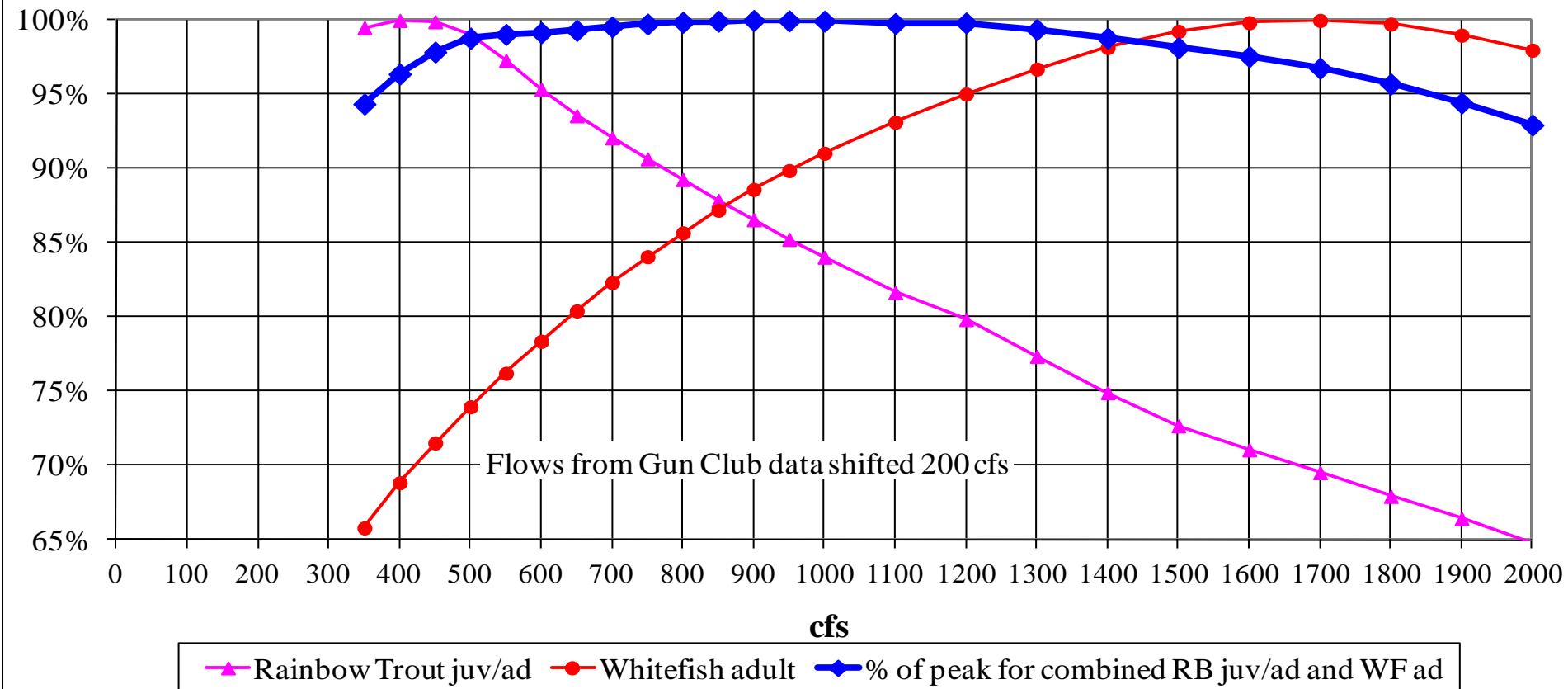
An aerial photograph of a section of the Upper Spokane River. The river is a vibrant green color, indicating high water levels and fast-moving water. Several large, dark grey boulders are scattered along the riverbank and in the water. The surrounding landscape is a dense forest of evergreen trees. The sky is clear and blue.

Summer instream flows (June 16-September 30)

- Upper Spokane River (above Sullivan Road):
 - **500 cfs** at the Barker Road gage
- Remainder of Spokane River:
 - **850 cfs** at Spokane gage

Rainbow trout rearing and mountain whitefish

Lower Spokane River Instream Flow Data
Combined Percentages based on 'at Spokane' Flow
Weighted Proportionally to Reach Length
(20% for 'at Spokane', 80% for Gun Club)

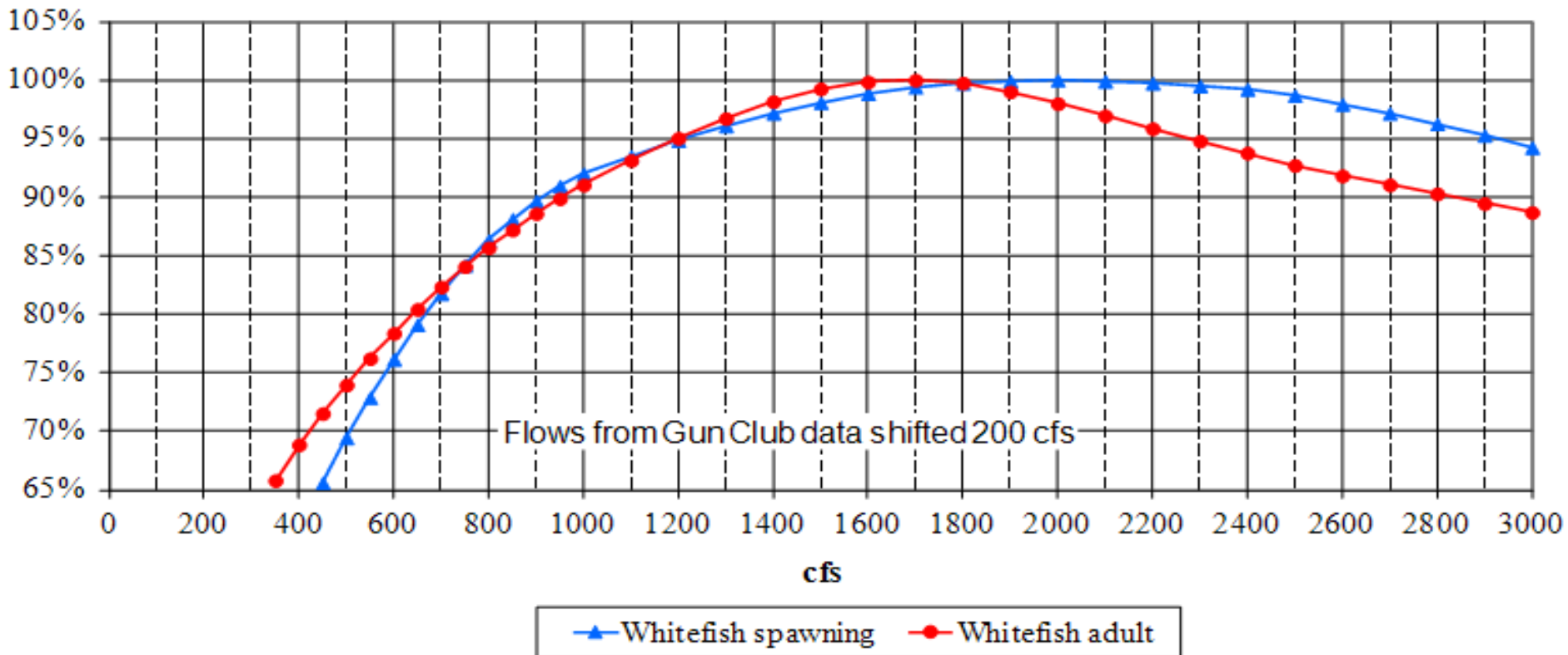


Fall and winter instream flows: October 1 – March 31

- Mountain whitefish
 - support a **sport fishery** during winter.
 - **feed actively** in winter.
 - are the **most numerous fish** in larger streams in Washington, including the Spokane River.
- In **fall and winter** we **prioritized whitefish** over trout
- Whitefish **spawn in fall**.
- Whitefish **spawning peaked near 1,700 cfs** in the lower river.
- In winter, rainbow trout have lower metabolic rates and tolerate more crowding than when they are active

Fall and winter instream flows: October 1 – March 31

Lower Spokane River Instream Flow Data
Combined Percentages based on 'at Spokane' Flow
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Flow management

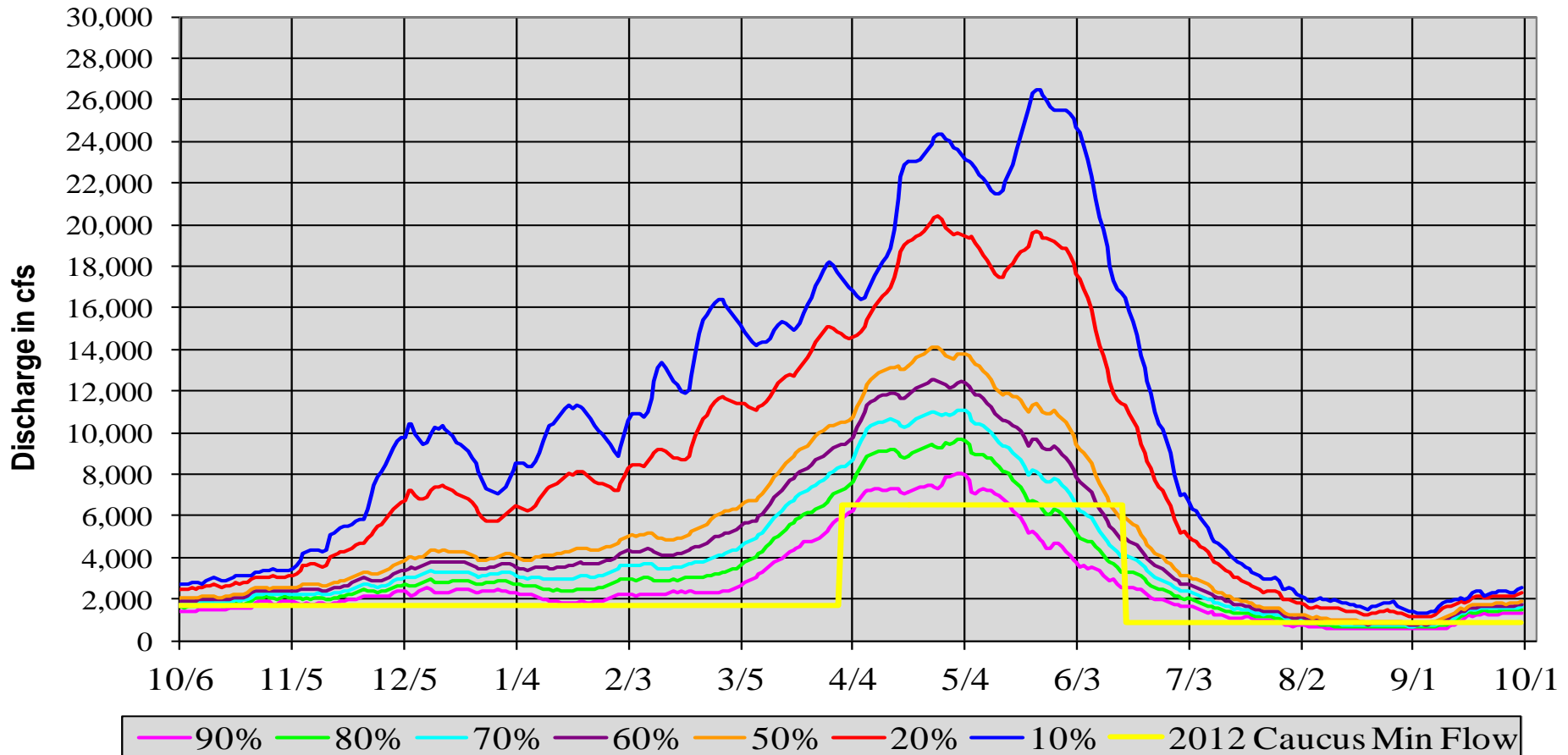
- Instream flow that limits major future withdrawal is important if major storage or export of water is potential
- (Would not affect existing water rights)

WDFW Instream Flow Recommendation for Spokane River at Spokane

- October 1 – March 31 1,700 cfs
- April 1 – June 15 6,500 cfs
- June 16 – September 30 850 cfs

WDFW Instream Flow Recommendations

Spokane R at Spokane Exceedance Curves 1986 - 2008





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